

GEO Field Guide

Featuring the

PresencePLUS® P4 GEO

Vision Sensor



more sensors, more solutions



Overview

The PresencePLUS P4 GEO is a vision sensor that inspects an area for features in any orientation or location. Parts to be inspected can travel randomly through the sensing area, saving the cost and complexity of hard fixturing.

- 360° pattern match
- High-speed sensing; can exceed 1500 parts per minute, depending on the inspection
- User-friendly setup
- Remote TEACH
- Live video feed without a PC
- \$995 price



The P4 GEO uses the same user interface found in all PresencePLUS vision sensors.

Right-Angle Housing Style



The P4 GEO is a self-contained vision sensor – no external controller is necessary.

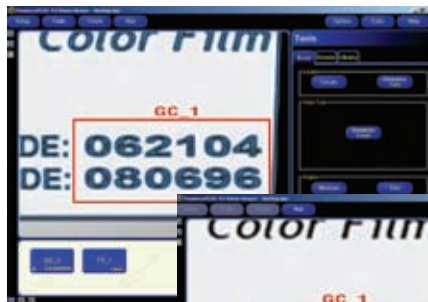
In-Line Housing Style



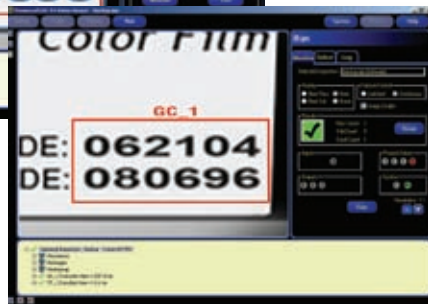
Overview

PresencePLUS Software

Easy to use; requires minimal training



Tools Menu



Run Menu

Remote TEACH Capability

After initial setup, the P4 GEO can learn a new target without a PC.



Live Video Feed

The P4 GEO provides a live video output, to display the sensing area without a PC.



Features



**In-Line
Housing Style**

Bi-Color Status Indicators

- Green = PASS
Red = FAIL
- Green = POWER
Red = ERROR
- Green = READY
Yellow = TRIGGER

Lens

- Standard C-mount

Housing

- Black anodized aluminum
- IP20 environmental rating
- Two housing styles available



**Right-Angle
Housing Style**

Features

12-Pin Discrete I/O

- Remote TEACH
- External Trigger
- Product Change
- 4 user-configurable I/O
- RS-232 connections
- 10-30V dc

NTSC Video Monitor

(Optional)

- Live images
- Holds failed inspection images



PC Connection

- Ethernet



Light Source

- Choose from ring lights, area lights and backlights
- Infrared and visible LED options
- Strobe option via sensor software
- 24V dc; see page 25



360° Pattern Matching



- During Setup, the user identifies a section of the image containing the target pattern in the sensor's field of view (FOV).
- A template of the pattern is generated for the GEO Count tool.
- The template is stored in the sensor's non-volatile memory. (If the sensor power is cycled, the inspection will be saved.)



PASS



PASS



FAIL

- The sensor searches images to find the template, regardless of orientation.
- When inspected images contain matching patterns, the inspected part will "PASS."
- When the sensor does not find a matching image, the inspected part will "FAIL."

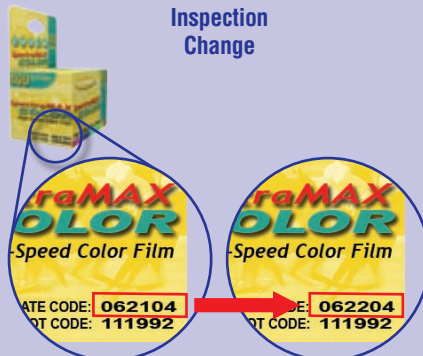
Remote TEACH

Inspection



- The P4 GEO inspects an ROI for missing, incorrect or “smudged” characters.

Inspection Change



- When the date code changes, the GEO Count tool must be taught the new pattern.
- Inspections taught via Remote TEACH are saved in volatile memory. (If the sensor power is cycled, the inspection must be re-taught.)

TEACH New Condition



- Configure the P4 GEO to inspect for the new date by toggling the Remote Teach input.

Inspection



- The GEO inspects the FOV for the pattern of the new date code.

NOTE: Remote TEACH changes the GEO Count tool reference pattern only; it does not change the exposure time, ROI, or sensor settings. When Remote TEACH will be used to teach new patterns for future similar inspections, initial setup must be carefully configured to accommodate all of the inspections.

Correct Container Lid Inspection Application

Objective:

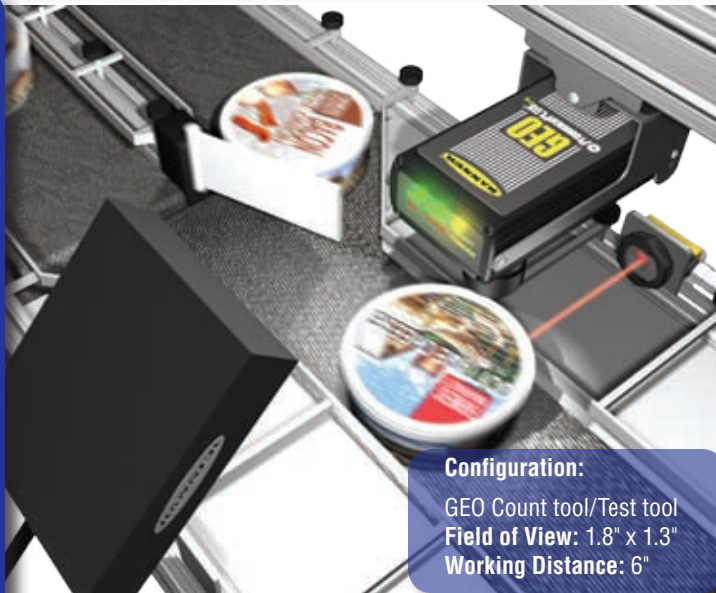
Verify that dairy product cartons have the correct lids, preventing the potentially costly return of a shipment.

Sensors/Components:

- P4 GEO P4GR
- 8 mm Lens LCF08
- LEDWA80X80M White Area Light
- QS30L Trigger Sensor

Operation:

Barcode reader verifies base container product and recalls proper lid inspection file in the P4 GEO. The GEO performs a 360° Geometric Count (GEO Count) inspection to verify correct lids and reject containers with incorrect lids.



Configuration:

GEO Count tool/Test tool
Field of View: 1.8" x 1.3"
Working Distance: 6"

Correct Container Lid Inspection Application: User Interface



Tools Screen

- Blue lines identify edges.
- The red rectangle shows the ROI for the GEO Count tool.



Run Screen
PASS

- Matching pattern passes, regardless of orientation.

Run Screen **FAIL**

- No matching pattern is found. No GEO Count tool ROI is shown.

Correct Part Verification Application

Objective:

Verify that the correct parts are ejected from a feeder bowl. As fasteners eject from the feeder bowl, a correct fastener in any orientation must be verified and an incorrect fastener must be rejected.

Sensors/Components:

- P4 GEO P4GI
- 8 mm Lens LCF08
- LEDRA80X80M Visible Red Area Light
- D10 Trigger Sensor

Operation:

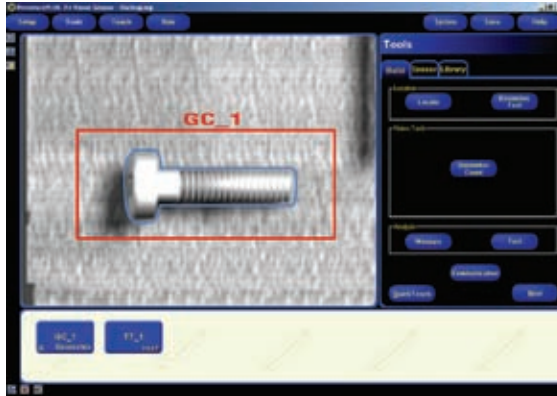
The P4 GEO will verify the presence of correct fasteners in any orientation.



Configuration:

GEO Count tool/Test tool
Field of View: 1.0" x 0.8"
Working Distance: 3"

Correct Part Verification Application: User Interface



Tools Screen

- Blue lines identify edges.
- The red rectangle shows the ROI for the GEO Count tool.



Run Screen PASS

- Matching pattern passes, regardless of orientation.



Run Screen FAIL

- No matching pattern is found. No GEO Count tool ROI is shown.

Date Lot Code Application

Objective:

Inspect the current date and lot codes on film cartons

Sensors/Components:

- P4 GEO P4GR
- 8 mm Lens LCF08
- LEDGR62X62M Green Ring Light
- D10 Trigger Sensor

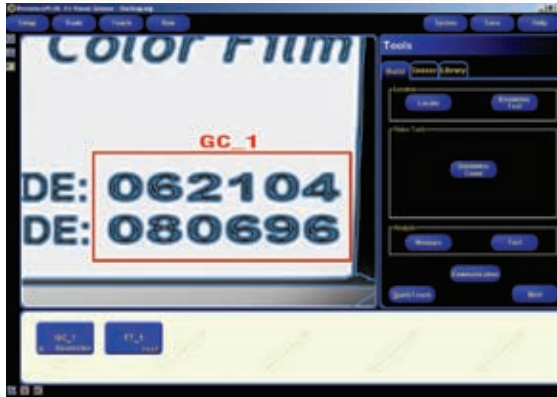
Operation:

The P4 GEO inspects for missing, incorrect or smudged characters. Cartons that fail are diverted.

**Configuration:**

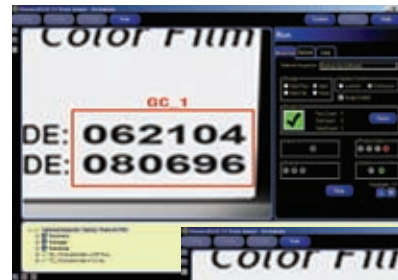
GEO Count tool/Test tool
Field of View: 0.8" x 0.5"
Working Distance: 2.5"

Date Lot Code Application: User Interface



Tools Screen

- Blue lines identify edges.
- The red rectangle shows the ROI for the GEO Count tool.



Run Screen PASS

- Matching pattern passes, regardless of orientation.



Run Screen FAIL

- No matching pattern is found. No GEO Count tool ROI is shown.

Component Inspection Application

Objective:

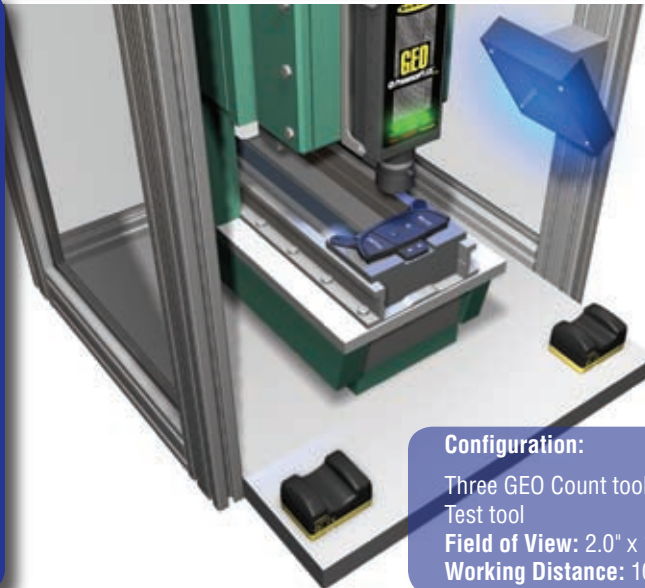
Verify that a button assembly is assembled and oriented correctly before it is mounted in a steering wheel.

Sensor Model:

- P4 GEO P4GI
- 12 mm Lens LCF12
- LEDBA80X80M Blue Area Light
- OTB Trigger

Operation:

After assembling components of a button assembly, the operator triggers the P4 GEO to look at three patterns to verify the proper placement of the components.



Configuration:

Three GEO Count tools/
Test tool

Field of View: 2.0" x 1.5"
Working Distance: 10"

Component Inspection Application: User Interface



Tools Screen

- Blue lines identify edges.
- The red rectangles show the ROI for each GEO Count tool.



Run Screen PASS

- Matching pattern passes, regardless of orientation.



Run Screen FAIL

- Only two matching patterns are found.

User Interface: Setup Menu

The Setup Menu captures a reference image and sets the trigger options.

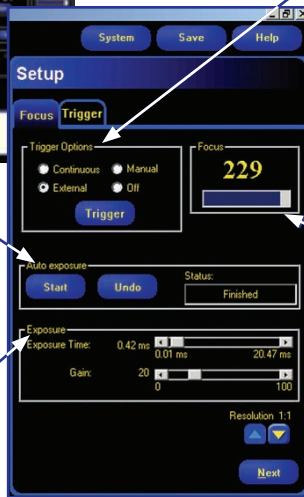


Auto Exposure

- **Start** sets exposure value
- **Undo** reverts to previous setting

Exposure

- **Time Setting** and **Gain**
- Used to control the brightness of the image



Trigger Options

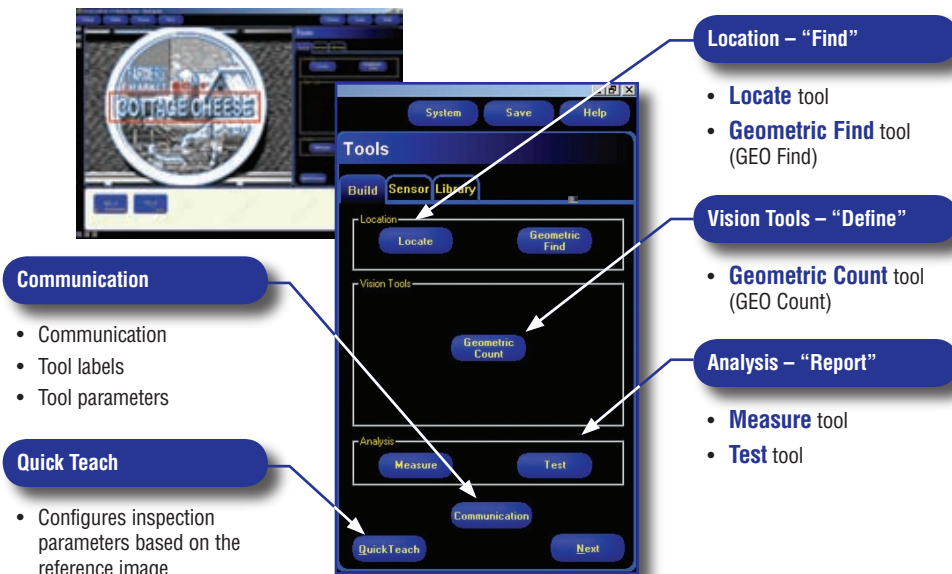
- **Continuous**
- **Manual**
- **External**
- **OFF**
- **Trigger** triggers the sensor when **Manual** is selected

Focus Value

- Number between 1 and 255 based on the contrast of the image

User Interface: Tools Menu

The Tools Menu establishes the inspections that a sensor will execute.



User Interface: Teach Menu

The Teach Menu sets the judgment tolerances of inspections on a good product.



Display

- Determines when the information displayed on the PC is updated

Start/Stop

- Initiates and stops the Teach process

Sample Size

- Use the **Count** option when there is a known sample set size

Capture Control

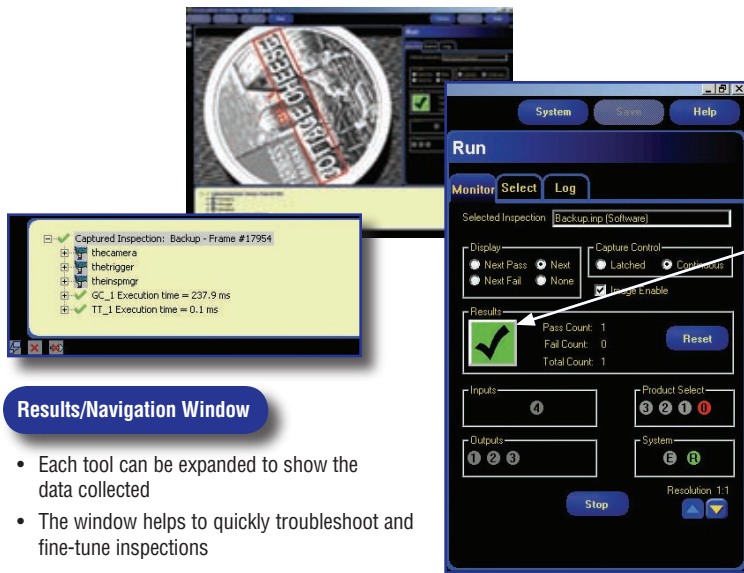
- Determine how the information is updated to the PC

Teach Counts

- Tracks the number of samples used in each Teach process

User Interface: Run Menu

The Run Menu monitors the inspections.



Results/Navigation Window

- Each tool can be expanded to show the data collected
- The window helps to quickly troubleshoot and fine-tune inspections

Basic Kits

Basic kits include sensor and the appropriate bracket. To complete a solution kit, add lensing (page 22), lighting (page 23), QD cable and optional monitor.

Model
P4GRKB



Basic Kits

Model	Description
P4GRKB	P4 GEO Right-Angle Sensor Basic Kit
P4GIKB	P4 GEO In-line Sensor Basic Kit

QD Cables

Model	Description
P4C06	2 m (6.5') Cable
P4C23	7 m (23') Cable
P4C32	10 m (32') Cable

Monitors

Model	Description
PPM7	7" LCD Wide Screen
PPM	9" CRT



Model
PPM7

Solution Kit Model Matrix

EXAMPLE: P4GR K B 23 12 SRR

Sensor

P4GR P4 GEO Right-Angle Sensor

P4GI P4 GEO In-Line Sensor

K

Kit

B

Bracket

Cable Length

06 6 feet

23 23 feet

32 32 feet

Lens Focal Length in mm

08 8 mm

12 12 mm

16 16 mm

Lighting

SRR Small Ring Light Red

SRW Small Ring Light White

SRB Small Ring Light Blue

SRG Small Ring Light Green

SRI Small Ring Light Infrared

LRR Large Ring Light Red

LRW Large Ring Light White

LRB Large Ring Light Blue

LRG Large Ring Light Green

LRI Large Ring Light Infrared

AR

Area Light Red

AW

Area Light White

AB

Area Light Blue

AG

Area Light Green

AI

Area Light Infrared

BR

Backlight Red

BI

Backlight Infrared



Lensing



Standard Lenses

Model	Description
LCF04	4 mm lens
LCF08	8 mm lens with focus locking
LCF12	12 mm lens with focus locking
LCF16	16 mm lens with focus locking
LCF25R	25 mm lens
LCF25LR	25 mm lens with focus locking
LCF50L1R	50 mm lens with focus locking
LCF50L2R	50 mm lens with focus locking, metal housing
LCF75LR	75 mm lens with focus locking, metal housing
LEK	C-mount lens extension kit Fits standard and high-performance lenses.



High-Performance Lenses

Model	Description
LCF06LT	6.5 mm lens with focus locking
LCF08LT	8 mm lens with focus locking
LCF12LT	12 mm lens with focus locking
LCF16LT	16 mm lens with focus locking
LCF25LT	25 mm lens with focus locking
LCF50LT	50 mm lens with focus locking
LCF75LT	75 mm lens with focus locking
FLTUV	UV lens filter, clear glass Fits 8 mm-75 mm high-performance lenses.

Refer to Banner Lens Guide (P/N 69950 rev. C or later) for more information

Lighting

LED Ring Light Models



62 mm Model	80 mm Model	Description
LEDIR62X62M	LEDIR80X80M	Infrared, 940 nm
LEDRR62X62M	LEDRR80X80M	Visible Red, 630 nm
LEDWR62X62M	LEDWR80X80M	White, All Visible
LEDBR62X62M	LEDBR80X80M	Blue, 464 to 475 nm
LEDGR62X62M	LEDGR80X80M	Green, 520 to 540 nm

Area Light Models



Model	Description
LEDIA80X80M	Infrared, 850 nm
LEDRA80X80M	Visible Red, 630 nm
LEDWA80X80M	White, All Visible
LEDBA80X80M	Blue, 464 to 475 nm
LEDGA80X80M	Green, 520 to 540 nm

Backlight Models



Model	Description
LEDIB70X70M	Infrared, 940 nm
LEDRB70X70M	Visible Red, 660 nm

Specialty Lighting



- On-axis, highly diffused and indirect lighting options for special-needs applications
- Refer to Banner Lighting Guide (P/N 69951 rev. C or later) for more information

Specifications

Model Numbers**Right-Angle:** P4GR**In-Line:** P4GI**Part Numbers****Right-Angle:** 71431**In-Line:** 71432**Imager**

2.56 x 2.06 mm (0.10" x 0.08"), 3.25 mm (0.13") diagonal CMOS; pixel size 20 x 20 microns

Exposure Time

0.01 to 20.47 milliseconds

Acquisition

500 frames per second max.

Image Size: 128 x 100 pixels**Levels of Gray Scale:** 256**Lens Mount**

C-mount

Discrete I/O

1 Trigger IN

1 Strobe OUT

4 Configurable I/O

1 Product Change

1 Remote TEACH

Input/Output Configuration

NPN or PNP software selectable

Output Rating







150 mA

ON-State Saturation Voltage: <1V at 150 mA max NPN; >V ± 2V**OFF-State Leakage Current:** <100 microamps NPN or PNP




Specifications

Communication	RJ-45 Ethernet RS-232 flying leads
Display Options	PC or NTSC video (9 m [30'] max. cable length)
Memory	Stores up to 12 inspection files
Power	Voltage: 10-30V dc (24V dc if a light source is powered by the sensor) Current: 500 milliamps, maximum
Dimensions	Right-Angle: 55.6 x 66.8 x 124.5 mm (4.9" x 2.63" x 2.2") H x W x L In-Line: 34.3 x 66.8 x 147.3 mm (1.35" x 2.63" x 5.8") H x W x L (Measured length does not include connectors or cables.)
Mechanical	Construction: Black anodized aluminum Weight: Approximately 0.29 kg (0.642 lb.) Environmental Rating: IEC IP20; NEMA 1 Operating Temperature: 0° to +50°C (+32° to +122° F) Maximum Relative Humidity: 90%, non-condensing
Certifications	Approvals in process

Hardware

	Model	Imager Technology	Imager Size	Housing Style	Lensing Options	Live Video	Communication	Discrete I/O
		CCD	640 x 480	In-line	Standard C-Mount	NTSC	Ethernet RS-232C	6 Configurable Functional Timing
		CMOS	128 x 100	In-line or Right-Angle	Standard C-Mount	NTSC	Ethernet RS-232C	4 Configurable Functional Timing
		CMOS	512 x 384	Right-Angle	Standard C-Mount	N/A	RS-232C	3 Configurable Functional Timing

Software

Model	User Interface	Location/Rotation Adjustment	Vision Tools	Analysis	Inspection Configuration	Multiple Inspections
	Menu-Driven	Locate (+/-) 90° Rotation Pattern Find (+/-) 10° Rotation	Pattern Count BLOB Edge Object Average Grey	Measurement Test	Manual Quick TEACH TEACH	12 Inspections – Remotely Selectable
	Menu-Driven	Locate GEO Find (+/-) 360° Rotation	GEO Count	Measurement Test	Manual Quick TEACH TEACH Remote TEACH	12 Inspections – Remotely Selectable
	Menu-Driven	N/A	Pixel Count	N/A	Manual Quick TEACH TEACH	4 Inspections – Manually Selectable from Optional Hand-Held Controller

For additional information...

Lighting Guide

P/N 69951 rev. C or later

Quick Start

P/N 118000

Lens Selection Guide

P/N 69950 rev. C or later

User's Manual

P/N 117020



PresencePLUS Software

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